INSULATION MATERIAL AND METHOD FOR MANUFACTURING THE INSULATION

Background art

The invention relates to building materials and applies to a coating for insulation material. The coating includes metal, such as aluminium. The invention also applies to the manufacture of the coating, and its use in insulation materials. The invention is suitable for use, for instance, in insulation materials that include expanded plastics or fibre wool.

Building technology uses different insulation materials, in which a coating has been joined to a porous insulation layer. The coating can be used to improve the insulating properties, durability, fire safety, dimensional stability, or the appearance of the material.

Aluminium foil is often used in the coatings of insulation materials. It is impermeable to gas and incombustible, and reflects thermal radiation. The aluminium sheet is joined to the insulation layer by means of a plastic adhesion layer. The insulation material is manufactured in the following manner: firstly, the adhesion layer is joined to the aluminium sheet, after which the laminate that has thus been produced is joined to the insulation layer. This can be done, for instance, onto polyurethane while it is still in a reactive state, whereby the layers self-adhere without separate gluing. When there is a gas-tight aluminium layer against the layer of expanded plastic, the propellants in the expanded plastic remain inside it to an optimal degree.

One problem here is, however, the coating's insufficient strength in the manufacture of the insulation material. The aluminium sheet tears easily when it is pulled into the machine. For example, when coating polyurethane insulation that is still forming, the resulting malfunction causes extremely great disadvantage, as the swelling polyurethane foam spreads and stains production machinery and premises. In fact, the primary function of the coating in such a situations is to protect the process machinery from reactive and sticky insulation material in the initial phase of the process.

General disclosure of the invention

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The present invention concerns a coating for insulation material as claimed in claim 1. Its characteristic feature is that it comprises a metal layer, such as an aluminium layer, to which is joined a plastic layer containing a plastic that crystallises when heated. The plastic is such that it can be joined to the metal film particularly by extrusion. The plastic may be a polyamide, such as polyamide-6 or polyamide-66. The heat at which the plastic crystallises may be, for instance, 100-160°C. There may be an adhesion layer between the metal layer and the plastic layer.

The invention also concerns a method for producing insulation material coating as claimed in claim 2, in which method a coating as claimed in claim 1 is manufactured by extrusion.

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The invention also concerns a manufacturing method for insulation material as claimed in claim 3, in which method a coating as claimed in claim 1 is used. In the method, the coating is joined to an insulation layer, and the plastic layer is heated so that the plastic crystallises. The insulation layer may more particularly be an expanded plastic, such as polyurethane or polystyrene. In this case, the coating can be joined to the insulation layer while the insulation layer is being formed. When the forming of the insulation layer is exothermal, the heat that is generated can be used in crystallising the plastic of the plastic layer.

During the process of manufacturing the insulation material, the plastic layer protects the coating, especially from tearing. While crystallising, the plastic layer becomes rigid, and thus the insulation material gains solidity and surface strength.

The invention also concerns insulation material as claimed in claim 8, which material is manufactured by using coating in as claimed in claim 1, in which the plastic layer includes a polyamide that crystallises when heated.

Detailed description of the invention

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In an embodiment as shown in figure 1, a layer 2 (e.g. approx. 30 g/m2), including a polyamide-6 that crystallises when heated, has been joined to an aluminium layer (e.g. approx. 50 µm). The coating thus obtained has been joined to the foamed polyurethane layer 3 in such a way that the polyamide layer remains between them, and the polyamide layer has been heated in order to crystallise the polyamide.

In order to improve adhesion between the aluminium layer 1 and the polyamide layer 2, there is an adhesion layer 4 between them containing a suitable adhesive plastic. Correspondingly, in order to improve the adhesion between the polyamide layer and the polyurethane layer 3, there is an adhesion layer 5 between them. Furthermore, the outer surface of the aluminium layer is coated with a surface layer 6 (e.g. HD-polyethylene). The surface layer may include necessary additives, more particularly a fire retardant.

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A product according to figure 1 can be manufactured more particularly in such a way that an adhesion layer 4, a polyamide layer 2, an adhesion layer 5 and a surface layer 6 are joined to aluminium sheet 1 by extruding in several phases. The extrusion is carried out in such a way that the polyamide does not yet substantially crystallise. The coating 1 thus formed is joined to an expanded polyurethane layer 3 while it is being formed. The forming reaction of polyurethane is exothermal, whereby the coating also heats up. During the manufacturing process, the polyamide layer is allowed to heat up to the crystallisation heat of polyamide (e.g. 120-140°C, such as 125-135°C, typically approx. 130°C), whereupon the polyamide crystallises. The necessary crystallisation time may, for instance, be 1-5 minutes. When choosing the polyamide, its extrusion properties are taken into consideration.

By using the coextrusion technique, the number of manufacturing phases can be reduced.

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The polyamide in polyamide layer 2 is flexible and glutinous when uncrystallised. Thus, the coating is easy to run on the machine, and it withstands the process well without tearing. When it crystallises, the polyamide layer strengthens and stiffens, thereby

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producing an insulation material that is sufficiently strong and stiff. The crystallised polyamide also increases bursting resistance.

In the embodiment shown in figure 2, there is an aluminium layer 1.1, on top of which a polyamide-6 layer 2.1 has been joined. The coating thus formed has been joined to polyurethane layer 3.1 in such a way that the aluminium layer1.1 remains between them.

In order to enhance the adhesion of aluminium layer 1.1 and polyamide layer 2.1, there is an adhesion layer 4.1 between them. The adhesion layer may contain pigment, more particularly white pigment. Correspondingly, in order to increase adhesion between aluminium layer 1.1 and expanded polyurethane layer 3, there is a lacquer layer 7 (e.g. approx. 2 µm) between them.

Insulation material according to figure 2 can be manufactured similarly to the material according to figure 1, described above. The coating can be formed by coextruding in two phases, more particularly in such a way that, firstly, a polyamide layer 2.1 and an adhesion layer 4.1 are joined to each other, and then joined to an aluminium layer 1.1 and an adhesion layer 7.

In the embodiment shown in figure 3, there is a layer of fibre wool 8 (e.g. mineral wool approx. 50 mm), on top of it a layer of non-woven mat 9 (e.g. glass fibre mat approx. 50 g/m2), a plastic layer 10 (e.g. polyethylene approx. 40 g/m2), an adhesion layer 5.1 (e.g. approx. 2 µm), a polyamide layer 2.2 (e.g. approx. 30 µm), an adhesion layer 4.2 (e.g. approx. 2 µm), a layer of aluminium foil 1.2 (e.g. approx. 50 µm), and a lacquer layer 6.1 (e.g. approx. 3 µm). During manufacture, heat is passed from above through the entire layer. Melting occurs at a temperature of, for example, 140-160°C, typically at approximately 150°C.

In addition, figure 4 presents a product corresponding to figure 2, in which the insulation is a layer of polystyrene foam (EPS) 3.2. On top of it, there is a layer of hot seal lacquer 7.1 (e.g. approx. 2 µm), a layer of aluminium foil 1.3, an adhesion layer 4.3

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(e.g. approx. 2 µm), and a polyamide layer (e.g. approx. 30 µm). In manufacturing, heat is applied from above. The polystyrene foam 3.2 melts and adheres to the hot seal lacquer 7.1.

Insulation materials according to the invention can be manufactured so that they meet the fire regulation norms.